

The Reappearance of Saturn's Rings. By George C. Comstock.

(Communicated by H. H. Turner, M.A., B.Sc.)

The communication respecting the reappearance of *Saturn's* rings made to the Royal Astronomical Society by the Rev. A. Freeman, M.A., and published in the *Monthly Notices* for November 1891, makes it proper that I should publish through the same channel the results of observations of *Saturn* made at this observatory, although a brief account of some of them has already appeared in the *Sidereal Messenger* for November.

At my request Mr. S. D. Townley, assistant in the observatory, commenced about the middle of October an examination of *Saturn* on every clear morning, using the Clark equatoreal of 40 cm. aperture with the so-called zone eyepiece, giving a power of 145 diameters. On a few mornings I myself took part in the observations, which is indicated in the following extracts from Mr. Townley's note-book, by the letter *C*, prefixed to those parts of the observing for which I am personally responsible. The remaining, and by far the greater number of, observations are by Mr. Townley. The times are given in mean solar time of the meridian 90° west of Greenwich, and the dates in civil reckoning.

1891 October 16.—Rings not visible. The shadow of the rings on the ball is seen plainly. Also belts on each side and parallel to the shadow; south belt plainer. The shadow of the rings appears to divide the ball into two unequal parts, of which the southern (?) part is the larger. Seeing good. *C*. confirms the above description.

October 20, $4^h 50^m$.—Rings not visible, but seeing is not very good. $5^h 24^m$. Seeing better than before. Rings visible, but most plainly in preceding limb. *C*. Mr. Townley called me to the telescope, saying that he could see the rings. The ansæ are visible with difficulty, but certainly on both sides of the planet; more plainly on the pr. side. Ansæ project beyond the ball—two-thirds of the diameter of the planet.

At $5^h 45^m$ made sketch of *Saturn* with power of 310 diameters, with approximate location of the satellites visible near the ball. These were subsequently identified from Marth's ephemeris. At the time of the sketch, Rhea could just be distinguished at its reappearance from behind the ball of the planet. A measurement from the sketch places it $4''.1$ south of the planet's equator at the time of reappearance.

October 22, $4^h 30^m$.—Rings not visible. Seeing very bad. $4^h 50^m$. Seeing is not much improved. Thought once that I caught a glimpse of the rings on the following side. $5^h 30^m$. No rings visible, but daylight too far advanced for the best seeing. *C*. No rings visible at $4^h 45^m$ and $5^h 55^m$.

October 25, 5^h 10^m.—Rings visible by glimpses, extending on both sides of planet to distances of 0·6 or 0·7 of the planet's diameter.

5^h 30^m.—Same as above, with power of 145; but could *not* see rings with power of 310. Images very steady, but faint, on account of heavy fog which envelopes the observatory.

October 26, 5^h 15^m.—Rings visible by glimpses. Seeing so bad that I cannot see the markings on the planet's surface.

October 27, 5^h 15^m.—Same as October 26.

October 31, 5^h 15^m.—Rings plainly visible as continuous lines, extending on each side to a distance of about 0·6 the diameter of the ball. Tried power of 310, but could see nothing. Seeing rather bad. Images diffuse and unsteady.

November 5, 5^h 20^m.—Rings very plainly visible, extending on each side 0·5 the diameter of the ball. Seeing not good.

The above observations, made with superior optical appliances, are entirely inconsistent with Mr. Freeman's conclusion "that the plane of *Saturn's* rings probably passed through the Sun's centre on November 1, at about 6 A.M., or possibly one hour, or two hours at most, earlier"; and it is a matter of surprise that he should not have detected the ansæ on October 30 and 31, since the difference between the apertures of his telescope and the one employed at Madison cannot well explain a difference of ten days in the date of reappearance of the ring.

In one respect, however, I wish to confirm Mr. Freeman's observations. My sketch of October 20, above referred to, shows the broad band across *Saturn's* disc wholly south of the equator, and its southern edge *very slightly curved*, with convexity southwards.

Washburn Observatory:
1892 January 1.

Ephemerides of the Satellites of Saturn, 1891–92. By A. Marth.
(Concluded.)

The following list of phenomena is a continuation of that published to the end of April, on p. 195. From the middle of April to the end of June the planetocentric latitude of the Earth above the plane of *Saturn's* equator is less than 1°, and the apparent orbits of the satellites are very narrow ellipses, so that the distances of the satellites at the times of their conjunctions are very small. I have therefore considered it worth while to make a search for the conjunctions which occur during the indicated period and are observable in America or Europe, and to insert them in the list, in the hope that favoured observers will duly attend to these rare and interesting test-phenomena, and will measure the differences of the rectangular coordinates parallel to the axes of the planet's disc, or in the position-angles